

the sewer self-cleansing, and to prevent the formation of the poisonous sewer gases, which are always formed when the progress of the sewage out of the town is slow, in spite of all the ventilation schemes that may be tried.

A circular sewer, one foot in diameter, running half full, at an inclination of 1 to 600 will discharge 46.3 cubic feet per minute, at a velocity of 118 feet per minute, equivalent to a discharge of 167,000 gallons (in round numbers) in 8 hours. This is slightly over the discharge of 5,500 persons, allowing 30 gallons to each person, so that this one-foot sewer would suffice if rain-water is to be disregarded.

AMOUNT OF RAIN-FALL TO PASS INTO SEWERS.—Let us next ascertain the size of a sewer on the supposition that the town is one square mile in area, and that a rain-fall of one inch in 24 hours actually drains into it. The rain-fall is 2,323,200 cubic feet in 24 hours; or at the rate of 1,613 cubic feet in one minute. By use of proper formulæ, it is found that an egg-shaped sewer, $3\frac{1}{3}$ by 5 feet, running full, will discharge the water at a velocity of $3\frac{2}{3}$ feet per second, the inclination being taken, as at first, at only 5 feet to the mile.

We can now readily see, by this particular example, how much the size, and hence the cost, of sewers is increased by making provision to receive the rain-fall. It is, of course, far more expensive to provide for the exceptionally heavy rain-falls (as "6 inches in 2 hours," etc.) which sometimes occur. Sewerage systems in this country do not provide for such exceptional rain-falls.

The London intercepting sewers were constructed to carry $\frac{1}{4}$ inch rain-fall in 24 hours, at the time of maximum flow of sewage, larger amounts being provided for by storm-water overflows.

It is found that different soils, or surfaces, have not the same absorptive power; thus in London the sewers in some sections deliver one-half the rain-fall, whilst in entirely paved streets, nearly the whole of the water is drained into them.

Latham says that in Croyden, the soil being porous, gravel overlying chalk, "the amount of rain contributed by a storm of